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The CHEMIST

SEPTEMBER • 1935

Publication of The AMERICAN INSTITUTE of CHEMISTS

THE PAPER INDUSTRY

• • •

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The CHEMIST

Publication of

THE AMERICAN INSTITUTE OF CHEMISTS, INC.

V. F. KIMBALL, *Editor*, 233 Broadway, New York City

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EDITORIAL

The Campaign for New Members

By M. L. Crossley, F.A.I.C.

THE value of any organization in society is measured in terms of the contribution it makes to the advancement of civilization. This contribution is great or small, depending upon the degree of organized effort to attain the charted goal. The ideals and purposes of the organization must be known and shared by all of its members if solidarity of action is to prevail. This kind of action is essential to the complete fulfillment of the high purposes of the organization.

At the beginning of this fiscal year of the Institute we dedicate ourselves anew to the task of securing solidarity of action in promoting the welfare of the chemist and extending his influence in society. As a means to this end, we must secure the active participation of all chemists. This can be accomplished only by the entire membership of the AMERICAN INSTITUTE OF CHEMISTS becoming so imbued with the spirit of the organization as to learn to know its aims and to share its ideals and aspirations. We must become infected with the virus of the organization before we can be potential transmitters of the germ to others. To believe in any cause, we must know it thoroughly. To convince others of its worth, we must be sure of it ourselves. When every Fellow of the Institute realizes the privilege Fellowship bestows upon him, he will recognize the corresponding obligation imposed to uphold the honor and dignity of the profession. Then each member will aid in the extension of the privilege of Fellowship to all who are qualified by education and experience to participate in the building of a strong profession having the capacity for influential leadership in the advancement of modern civilization. It is important that each of us should immediately accept the responsibilities of our profession and do his utmost to insure its success. The most immediate and important problem of the Institute this year is that of drawing together all who are qualified for the profession of chemist. After twelve years of organized effort, the foundation of the profession should have been thoroughly laid and we should now be ready for the erection of the details of the superstructure on this foundation.

There are many outstanding chemists who should be given the opportunity to share in the promotion of the advancement of the profession. The work cannot be done adequately by a few chemists. The few may inspire the many to work hard for the realization of the purposes of the profession but numbers are required to make the work effective. If it be granted that there is need for professional solidarity among chemists, then all chemists should aid in securing it. To make this possible the financial burdens of the chemist should not be materially increased. With this in mind, the Council of the Institute accepted the recommendation of its Membership Committee last Spring to lower the annual dues of the Institute to five dollars. This should not be a serious burden to anyone and should be adequate for the support of the work of the Institute, provided all who meet the qualifications for Fellowship join with us in the work of the Institute. The active participation of the greater number of chemists in the building and maintenance of a high professional standing is of greater importance than the amount of dues paid by the selected few. The Institute is not worth while unless it can have the support of the entire profession. It is imperative that this support be sought at once. The income of the Institute was immediately halved by reducing the dues and the effectiveness of the work of the Institute will be greatly impaired unless the membership is at least doubled this year. This should not be difficult to accomplish if it is accepted by each member as his responsibility and if he does his part in bringing in new members.

The Membership Committee has developed a plan which requires that the entire membership of the Institute take an active part in the membership campaign. It is desirable to have each member suggest the names of chemists whom he is able to contact and convince of the desirability of joining the Institute. It is essential that this be done faithfully and promptly. A few minutes' time spent by each member in presenting the Institute to prospective members should be more effective in securing membership than all of the letters that can be written by the Committee. It is important that prospective members be convinced of the high purpose of the Institute and the part that they should play in helping to realize this purpose. Now is the time for action. We are all members of the Committee on Membership, you and I—no one is excluded. Let us all strive to see how many chemists we can add to the ranks of the Institute each month of this fiscal year.

Honorary Member

OTTO P. AMEND

At the latest meeting of the National Council of THE AMERICAN INSTITUTE OF CHEMISTS, Dr. Otto P. Amend, a Fellow of the Institute since 1929, was elected an Honorary Member. Dr. Amend is president of the firm of Eimer and Amend.

Institute Protests Discriminatory Legislation

THE Copeland Bill, S-5, for revision of the present Federal Food and Drugs Act of 1906, if passed and properly enforced, will employ many chemists, yet this professional group is omitted in the Bill's definition of persons capable of rendering "scientific opinion."

The Definition of Terms (Chapter II) is:

> (l) The term "medical profession" means the legalized professions of the healing art; and the term "medical opinion" means the opinion, within their respective fields, of the practitioners of any branch of the medical profession, the practice of which is licensed by law in the State or Territory where any drug or device, to which such opinion relates is held, sold, or distributed; and the term "scientific opinion" means the opinion, within their respective fields, of competent pharmacologists, physiologists, or toxicologists.

THE AMERICAN INSTITUTE OF CHEMISTS filed an official protest:

> We protest against the omission of "chemists" in the term "scientific opinion" in Senate Bill Number 5 introduced by Senator Copeland. The scientific opinion of chemists is certainly entitled to the same recognition as that of pharmacologists, physiologists, and toxicologists.

Protests on behalf of consideration for chemists were also registered unofficially by Charles A. Barban, F.A.I.C., and Florence E. Wall, F.A.I.C., on grounds that the restrictions would rule out the testimony and opinion of qualified persons in many branches of chemistry.

Mr. Walter G. Campbell, Food and Drug Administrator, conceded that the word "chemists" might be included, but that it should be restricted to "biological chemists."

Institute Suggests Relief Projects for Unemployed Chemists

THE AMERICAN INSTITUTE OF CHEMISTS has suggested to the Works Progress Administration the following subjects to receive a proper proportion of the $4,800,000,000 governmental appropriation as proper projects for the employment of unemployed chemists:

Industrial Working Conditions in the Chemical Industry.

Air Pollution Survey.

Sewage Disposal Survey.

Natural Resources Survey.

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The Chemist in the Pulp and Paper Industry

By M. M. Rubin, F.A.I.C.

A chemist associated with a large pulp and paper company discusses the contribution made by chemists to this industry.

FEW of us ever pause to consider what chaos would result if some common commodity such as paper suddenly should be come unavailable. Paper, like money, is a basic means for exchange; exchange of human ideas, information, and materials. Today, paper is an article so low in price, so abundant, and so uniformly evaluated and distributed that few of us realize what an important part it has in our political, social, industrial, and economic affairs.

The discovery of printing from movable type by Gutenberg in 1450 A. D. was of revolutionary importance in accelerating and extending the dissemination of factual knowledge and learning. But without a plentiful supply and low cost of paper and paper board, the international scope of the graphic arts industry would have been impossible. While human thought and experiences could be expressed by speech, the transfer and accumulation of these for posterity in permanent record form was possible only by writing or printing. Accordingly, paper has always been one of the most significant of the articles of commerce, its tonnage production an accurate barometer of the extent of world industrial and educational activity, and its per capita consumption a true measure of the degree of civilization and economic progress of each nation.

History of the Art of Paper Making

The history of paper making is the history of human life and improvement in records from the Stone Age and the Rosetta Stone to the Age of Cellulose. Pick, chisel, chalk, stylus, and charcoal were the forerunners of the modern pencil; and stone, plastic clay, wood, beeswaxed boards, leaves, papyrus, and parchment were the predecessors of modern vegetable fiber pulps and papers. As a writing material, papyrus was used

down to the middle of the tenth century and can be traced back to Egyptian documents of 3536 B. C. The art of paper making from pulped vegetable material such as bamboo and rags dates back to the Chinese of the first century A. D. In the seventh century the secrets of this craft were acquired by the Moors, and linen papers were made in Persia. In Europe, paper manufacturing was introduced first in the eleventh century by the Moors in Spain, was well established in Southern Europe by the 14th century, but in England it was not established until 1678. Whatman, famous paper maker known to chemists for the manufacture of fine quantitative filter papers, started up his mill in England in 1760.

The retarded development of the paper industry in England was reflected in America, the first paper mill being commenced in 1690 near Philadelphia by an emigrant from Holland. However, paper making did not prosper here until the latter part of the 18th century. From then on the industry developed steadily, but slowly, owing to shortage of raw materials in the American colonies. Paper was made entirely by hand and mainly from beaten rags, large quantities of which were imported from Europe. Cotton and linen rag fibers, some straw, jute, and hemp were the entire source of available paper making raw materials. Rags were used for all paper grades such as news, wrapping, writing, and printing. By 1803 the first Fourdrinier machine for paper making had been started up in England, but productive capacity in the paper industry in English speaking countries remained low due to scarcity of basic raw materials. With such conditions, expansion of the industry was practically impossible.

Modern Science of Pulp and Paper Manufacture

PRODUCTION of mechanical and chemical wood pulp for papermaking was unknown until about 1865. Due largely to the influence of chemists and technologists in making available from wood large supplies of new, better, and cheaper fibrous raw materials, the evolution of pulp and paper manufacturing as a major industry has taken place practically in the last century. Chemical discovery and improvement of the sulphite, groundwood, soda, and sulphate wood pulping, hydrochlorite bleaching, pigmentation, and aniline dye coloring processes permitted rapid growth and expansion of an American pulp and paper industry which ranks today fifth in importance among the industries in the United States and first among those in Canada. Over 70% of the world's present production of pulp, paper, and paper board is manufactured from mechanical or chemical wood pulp. Wood has become the most important raw material for paper making.

Chemists and Wood Pulping Processes

THE sulphite pulping process was first patented and chemical wood-pulp fiber for paper making produced in 1867 near Philadelphia by the American chemist, Tilghman, but the first commercially successful sulphite mill was started in Sweden in 1874 through the efforts of the Swedish chemist, C. D. Ekman. In 1875 the annual output of this mill was about 485 tons. Other chemists who contributed to developments and improvements in this branch of chemical or sulphite pulping of chipped woods were Mitscherlich in Germany (1880), Ritter and Kellner in Austria (1878). The patented rights of these pioneers in Europe were purchased and methods transferred to the United States and Canada between 1885–1887. By 1925 technical developments whereby new types of woods and improved pulping schedules could be used broke down the last natural restrictions to industrial expansion, and practical improvements in these processes had reached the stage where annual output of sulphite pulp in North America amounted to 2,250,000 tons.

Mechanical or groundwood pulp manufacture likewise started first in Europe about 1850, the first groundwood pulp in America being made in a mill in Massachusetts in 1867. Early types of wood grinders were poor in mechanical design and construction, maintenance costs were high, quality of fiber produced and output were low, yet this pulp was and has remained much cheaper than the more expensive contemporary chemical wood pulps and rags.

The soda process for manufacture of chemical pulp is the oldest, but it has been developed principally since 1880. The sulphate pulping process was begun in Germany in 1884 as a modified soda process. The first mill for manufacture of "kraft" pulp was not begun on this continent until 1908. This branch of the industry soon became very popular in North America, especially in the production of coarse wrapping and bag papers, so that from an initial mill with output of 25 tons daily in 1908, there grew up 33 mills with daily capacity of 2,500 tons by 1920. Some chemists and chemical engineers in America who contributed largely to the chemical research and developments in manufacture and testing of pulp and paper include Carruth, Clark, DeCew, Edwardes, Griffin, Hatch, Herty, Johnsen, Kress, Mahler, Rue, Stevens, Sutermeister, Traquair, Wells, and many others.

Influence of Chemistry from Economic Standpoint

The rate of growth, magnitude, and importance of this business is

apparent from the following statistical data:

Year	World Production of Paper — Production (Metric Tons)	Percentage Produced in Europe	Percentage Produced in U. S. A.	Per Capita Consumption of Paper in the U. S. A. Pounds
1800	10,000	..	..	...
1850	100,000	..	..	...
1874	800,000	95	..	...
1900	8,000,000	..	..	42
1904	.....	70	..	...
1910	9,000,000	..	..	95
1914	.....	60	40	...
1920	12,500,000	..	..	143
1924	14,000,000	..	..	...
1925	16,000,000	40	..	184
1927	.....	33	60	...
1928	21,150,000	..	..	208
1929	23,100,000	..	..	221
1930	21,600,000	..	..	200
1931	19,750,000	..	..	183
1932	18,420,000	..	..	156
1933	19,998,416	42	42	174
1934	.....	..	..	179

U. S. CENSUS OF PAPER MANUFACTURES

SUMMARY FOR THE INDUSTRY

	1929	1933
Number of establishments	685	598
Number of mills	702	608
Wage earners* (average for the year)	103,320	87,225
Paper production—tons	11,140,000	9,190,000
Paper machines capacity—tons	13,704,000	13,728,000
Wages	$140,398,374	$ 81,090,682
Cost of materials, fuel, and purchased electric energy	$574,607,978	$311,766,966
Products, total value	$967,186,026	$560,962,625

* (Not including salaried officers and employees.)

In 1934 the value of the world's paper output was over 900 million dollars. The number of paper machines in use in the United States was 881 Fourdriniers and 678 cylinders. Some of our large paper making states in order of productive capacity are New York, Michigan, Maine, Ohio, Wisconsin, Pennsylvania, New Jersey, Illinois, Washington, Louisiana, Massachusetts.

These figures indicate that simultaneously with the development of

the science of chemistry, and especially since the rise of organic and physical chemistry, the application of chemical principles and technical methods since 1875 to industrial operations in the pulp and paper field resulted in an enormous expansion in paper production in the United States as compared to the rest of the world. Up to 1929, except for relatively short periods, the consumption of paper in the United States rose in an unprecedented and unbroken line.

The important part played by chemistry and chemical engineering in the advancement of such an American pulp and paper industry cannot be overestimated. Chemists have been responsible largely for the rapid conversion of an ancient and well-established art of paper making to an exact science, definition, and evaluation of the basis of quality, price-value, and use requirements of pulp and paper-making materials and finished products. A competent analysis and advice on a paper manufacturing or converting problem today require all the extensive training, technique, and sound judgment based on practical experience, of a specialized paper engineer or consultant. Most operations in this industry are to a large degree technical—being essentially chemical or mechanical. In the transformation of pulp and paper making from skilled art to a science, rule-of-thumb methods are giving way to the meter stick and balance, to procedures based on technical calculations. Men with training in the various branches of chemistry (organic, industrial, physical) and of engineering (mechanical, electrical, civil, chemical, and forestry) are to be credited for making the pulp and paper industry of ranking importance in the United States, and with making the mills on the American continent into some of the largest and most efficient manufacturing plants in the world.

The influence of scientific men and methods in the cellulose field has created a demand for this basic material of the pulp and paper industry in many new and related industries, such as the manufacture of artificial silk, cellophane, and lacquers. Paper history threatened to repeat itself in that the source of raw material for these related industries was becoming a grave problem. Again, chemical science came to the rescue of industries threatened with a shortage of raw materials with a new process for a fresh source of cellulose from bagasse, a cane sugar refuse.

In this way about one million tons of bagasse are being made available from Hawaii annually, besides vast amounts from Cuba and Louisiana at a cost as low as $10.00 per ton. Demands of cellulose using industries are balanced thus by supplying from a waste product in the sugar industry to the mutual economic advantage and profit of several industries. The amount of money going to foreign countries by reason of

their export of wood pulps and bagasse to the United States is a large factor in maintaining economic trade balance with the United States.

A score of years back there were relatively few pulp and paper mill chemists in America. A Technical Association of the Pulp and Paper Industry was organized first in New York in 1915. In spite of the recent depression of 1932 and reduced production as indicated between 1929 and 1935, the membership of this body has shown steady growth from 200 to over 1,200 in the past twenty years, and includes practically all chemists, engineers, and technologists of importance in this industry and closely related industries. The chemist has become an essential part of every progressive pulp and paper manufacturing organization and while his activities in the industry until a few years ago were confined mainly to laboratory testing and research on materials used, plant process control, problem consultation, and cooperation, gradually he has been advanced into the operating, purchasing, sales, and service branches and to the management of the organization. Today chemists are found in all departments of pulp and paper mills from the forest to the shipping room, from the mill office and laboratory to the customer's plant; striving continually to reduce wastes, increase efficiency, effect improvements, develop new papers and new uses for pulp and paper, and apply technical methods generally in making more and better paper at cheaper prices.

Training of Chemists for the Industry

THE training of men for positions as chemists and future executives for the paper industry has been recognized recently as an important problem in maintaining the stability and progress of this great industry. Among the schools offering undergraduate courses in pulp and paper making subjects are the University of Maine and New York State College of Forestry. The Institute of Paper Chemistry, a graduate school connected with Lawrence College at Appleton, Wisconsin, was established about five years ago for training chemists especially for work on pulp and paper problems. Several doctorate degrees in this field have already been awarded by the Institute. Fundamental and applied researches in pulp and paper making are carried on also in about ten state university laboratories as well as government laboratories of the United States and Canada. Noteworthy also are Industrial Fellowships of Mellon Institute, The Paper Institute of Canada, Forest Products Laboratories of the United States and of Canada. Close cooperation is maintained also with pulp and paper research activities of men

and laboratories in the British Isles, Holland, Germany, and the Scandinavian countries.

Moreover, technical men are being continually exchanged between the pulp and paper industry and other industries developing new materials for use in paper manufacturing and paper products. The relationship and interdependence, the continuity rather than contiguity of the pulp and paper industry and a large number of other chemical industries—lumber; fuels, water, heavy chemicals, white and colored pigments, and dyestuffs, metals, glue, and leather; fats, waxes, resins; starch and sugar, explosives, textiles, plastics—are becoming more and more evident. Accordingly, some of the best technical men in the pulp and paper field today are those who entered paper mills with a background not of a specialized knowledge of pulp and paper manufacturing, but a thorough training and a broad and extensive knowledge of the fundamentals of chemical and related sciences coupled with an acquaintance with the economics of successful chemical industrial operations.

The statistical data given above indicates clearly the reason for lack of technical employment opportunities in the pulp and paper field during the past five years when the industry passed through a depression resulting from over-expansion, over-production, and unrestricted competition and making necessary great retrenchments and reductions in wages and personnel to meet financial obligations. Normally the paper industry retains and absorbs about eight per cent of the active chemists available or graduated annually from our technical schools and colleges. During the past few years the supply of technical men has exceeded the demands and prospects are rather dismal for the neophyte. However, there is always a healthy demand for high-grade technical men in an industry of the size and importance indicated, and at present a dire need of men of real executive caliber. Earnings now range from the NRA code minimum of 38¢ per hour for shift work testers to salaries ranging from $80.00 to $450.00 per month for experienced chemists and competent technical and research directors, and even up to $25,000.00 to $40,000.00 annually for high-grade technical managers and executives of larger companies. The salary of the president of one of the largest power and paper companies was reported recently as $95,000.00 per year, greater thus than that of the nation's chief executive, and shown to be commensurate with real ability and earning capacity. Compared to other manufacturing enterprises, the average pulp and paper mill represents a heavy capital investment, and in times of economic stress, owners, investors, and bankers will entrust pulp and paper plant operations, control, and management only to chemists and chemical execu-

tives of exceptional promise or proved ability. To such men the industry still offers opportunities for rendering great service at great rewards.

Scope of Chemical Duties

WITH the annual production of paper in the United States about 9,200,000 tons in 1934 for about 600 mills, it is evident that there are still in operation a large number of small, high-cost mills of daily capacity ranging from 10 to 50 tons as contrasted to recent individual plants with a daily output of 400 tons of paper and paper board. Accordingly, the number of graduate chemists employed in a paper mill will vary from one or two men in the smaller companies to as many as one hundred men in some of the largest and most progressive pulp and paper organizations. The technical organization set-up and program will differ also with the type of plant, its location, and products made, but the ramifications and scope of duties and responsibilities of a modern pulp and paper mill technical staff indicates some of the following activities:

1. Testing of raw materials:
   Control of quality and specifications for purchasing of pulps, coal, chemicals, dyestuffs, materials for plant maintenance, and construction.
2. Process or operations control:
   (*a*) Filtration plant—water treatment, purification, and control.
   (*b*) Boiler plant—feed-water treatment, and control.
   (*c*) Wood room—check of logs, moisture, and chip size control.
   (*d*) Groundwood mill—quality of pulp production for specified paper quality.
   (*e*) Sulphite and bleach plant:
   Control of acid-making, pulp cooking schedule, bleach manufacture, pulp bleaching and washing, evaluation of pulp quality, mill effluent wastes.
   (*f*) Soda and Kraft mill:
   Control of alkaline cooking liquors composition, kiln, smelter, and evaporator operations, recovery efficiencies, testing of finished pulp quality.
   (*g*) Paper and paper board mill:
   Control of raw materials preparation, mill equipment corrosion and supplies deterioration, standardization of unit operations of paper making (beater furnish, beating, sizing, loading, coloring, jordaning, paper machine operating variables, pressing, drying, finishing, air and humidity control), mill effluent losses.
3. Quality inspection and testing:
   Standardization and control of finished paper quality, records of performance, and quality variation of products.

4. Technical service and sales development:
   (*a*) Plant patrol and chemical service to mill and laboratory operators.
   (*b*) Investigation and report on customer complaints.
   (*c*) Customer contact and analysis of customer usage requirements.
   (*d*) Cooperation on advertising and sales promotion.
5. Technical production, cost and purchasing control:
   Coordination of operating efficiency and economics of merchandising, transportation, finance; personnel management.
6. Applied industrial research:
   (*a*) Production process or conversion cost reduction.
   (*b*) Product quality improvement.
   (*c*) Substitution of cheaper raw materials.
   (*d*) Utilization of wastes, development of by-products, conservation, and patents protections.
   (*e*) Development of new and improved testing methods.
   (*f*) Development of new uses and new business.

Besides the above there are many mills making coated papers where chemists are responsible for a knowledge of viscosity control of white and colored coatings using such raw materials as casein, satin white, clay, and titanium oxide pigments, waxes, sulphonated oils, rubber latex, etc. Other mills operate de-inking plants for conversion or recovery of various grades of white paper shavings or printed waste paper used in a large number of grades of fine papers, coarse papers, paper boards and specialties. Detection of the amount of waste paper or "broke" used in a sample of paper is a problem akin to that of determining the amount of reclaimed rubber compounded with fresh para or wild rubbers for use in rubber shoes or tires. Chemists have contributed much to this branch of papermaking in recent years through introduction of new and improved emulsification agents, detergents, surface tension breakers and methods of cooking waste papers to remove inks by washing or bleaching. One such recent process consists of printing telephone directories and catalogs on cheap groundwood papers with an iron hæmatin lâke ink base which may be easily reduced again in the paper mill by used of sulphur dioxide. De-inking is a branch of paper chemistry in which physical chemistry and colloid chemistry are being utilized to great advantage.

Future Prospects

THE future of the paper mill chemist as such is uncertain. Technical zeal has been allowed to outrun economic discretion in the too rapid development of excessive production facilities in this industry. This, together with unrestricted competition brought the pulp and paper industry in America to a position of financial embarrassment. Besides,

for the past few years the paper industry has continued to operate on a reasonably sound economic basis, but at about 60% of capacity, and paid living wages. This has set a precedent which is inviting repetition.

However, there are prospects in view, the extent of which appears to be without visible limits. Large tonnages of pulp and paper are still imported into the United States owing to political agreements and tariff regulations dating back to 1911. Imports of some wood papers and paper base stocks into the United States during the past four years have amounted to an average of over 170 million dollars a year, or 70% of the annual American consumption. Of newsprint alone 2,350,000 tons valued at 93 million dollars, and representing two-thirds of our consumption of this grade is being imported from Europe, Canada, and Mexico. Recently, the brilliant work of Dr. C. H. Herty has shown that newsprint of good quality can be produced from Georgia pines at lower costs than the imported product. A new empire of opportunity has been opened up thus by an American pulp and paper chemist for the development of a paper industry in the South.

In the far West in the Pacific Coast states, developments are taking place in the chemical pulp producing field. Large new plants have been erected for the conversion of the vast forest resources of our Northwest to pulp for American paper mills, and for production of rayon pulps which have found a market in the newly industrialized countries of the Orient.

One of the greatest opportunities for chemists in the paper field now is in the development of new and improved uses for paper and paper products. In 1934 the productive capacity of the industry in the United States was 13,700,000 tons and actual production 9,186,000 tons or about 67 per cent of capacity. The estimated profitable capacity has been considered for some years to be about 12,000,000 tons. Accordingly, the demand would appear to be for increased chemical research, improved technical advertising, and distribution methods to balance profitable capacity by stimulating production and consumption through promotion of new uses and new outlets for pulp and paper.

The initial step requires making several million American families paper conscious and paper minded. For example, a manufacturer of crêpe paper, used mostly for parties and decoration purposes, has featured ladies' hats from crêpe paper. The style of these hats is made in complete harmony with the latest decrees of fashion. The crêpe paper may be crocheted to resemble beautiful fabricated straws seen in the smartest new bonnets. It wears like felt, is light on the head, has the pull-around qualities of fabric, but looks like straw, does not wilt in the

rain, and the various deep colors offered are made water repellant by chemical treatment. Fifteen cents buys enough crêpe to make a hat of any one of sixteen styles.

There are 9 known types, 70 classes, and some 900 kinds of uses of paper and paper-board products, but the field is far from exhausted. Households today have accepted roofing, wall, news, toilet, and towel papers; paper napkins, cups, plates, table covers, washable paper dish rags, window and lamp shades. Paper collars, shirt fronts, twine, baby diapers, and milk bottles have been introduced successfully already. How soon could we have paper rugs, lace curtains, bed spreads, sheets, pillow cases, and pajamas? Other family needs would include low-priced paper umbrellas, aprons, laundry bags, black kraft paper overshoes, latex treated paper raincoats, warm paper vests, and jackets, paper base gloves, and blankets. Possibilities are limited only by the cellulose chemists' initiative, imagination, and ingenuity.

The structure and properties of cellulose and lignin, the most important chemical constituents of wood used in pulp and papermaking, are still large problems for study and profit by pulp and paper chemists. The disintegration, swelling and gelatinization in water suspension of fibers for paper making by machine beating processes and mixing have remained from its inception almost two hundred years ago, throughout the development of this industry a mechanical batch process consuming costly amounts of power. Consummation of equivalent fiber swelling and fibrillation by some simple chemical means, similar to mercerization, with resultant elimination or reduction in the power requirement for stock preparation and refining is a problem the solution of which offers handsome rewards. If such results could be obtained by some new chemical means, the process of paper manufacturing might be converted from a batch to a completely continuous process, with improved uniformity of product quality and greatly decreased cost of manufacturing operations.

From a chemical pulping standpoint, lignin is the most important waste product of wood. Lignin comprises about 29 per cent and together with the sugars amounts to almost 50 per cent of bone dry wood. These materials are lost in the mill effluent wastes in sulphite pulping plants in America today. In spite of numerous researches on the subject, the structure of lignin still remains an unsolved and important problem in the pulp and paper industry. Already, it has been possible to establish definitely the presence of aromatic rings in lignin, so that the lignin waste from wood pulping, like the aromatic crudes from coal

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Papyrus

By F. M. Sterling

PAPER, as we know it, that essential commodity of our contemporary economy, begins its European history, first as an article imported through the Arabs from Asia in the ninth century and then as an article of European manufacture (by the Moors in Spain) from the twelfth century. The rôle that paper plays was created for it by a product of that useful reed of the Nile, the papyrus. Even the name was included in the heritage through the Greek.

The plant itself was employed diversely in ancient Egypt, as we know from Theophrastus. The root was used for fuel, the pith for food, stalks for boxes and baskets, fiber for cordage, sails, and matting, reeds in bundles for building boats, and most important for posterity, for papyrus, thin sheets of fibrous substance affording a writing surface. This writing medium is represented on wall paintings of the fourth millenium B. C., was known to the Assyrians as the Reed of Egypt, was used in Greece in the fourth century B. C. Boomed by the diffusion of Greek learning centering in Alexandria with its famous library, it became a great manufacture under the Ptolemies. It was papyrus which carried all of the imperial literature of Rome and the calligraphic business of that vast empire far into the Christian era, bearing the papal bulls until the middle of the twelfth century. In our own times, experiments have been made by various individuals, among them Sayffarth and Landolina, to manufacture paper from papyrus in Italy.

Since the cyperus papyrus, now confined to the upper Nile, has a homogeneous core of fiber, little chemical treatment and little mechanical action of the sort that is necessary in the making of paper from wood pulp and other fibers today was necessary in the preparation of the sheet. The pith was removed in thin layers, laid side by side on a flat surface with a second layer superimposed at right angles. The use of an adhesive of some sort is doubtful, but after possibly an application of gum, the sheet was pressed and dried ready for use. Frequently sold in twenty-sheet lengths, its color was white tending to brown with age and its size varied from nine inches to fifteen and one half in length, from five to nine in width. Some earlier sheets were longer. The rectangular sheets, or charta, as both sheets and documents were called, graded and sized, had standard names in Roman days, the highest grade of large size being "Imperial;" other types were "Livian," named after Augustus' wife, and "Sacerdotal."

AT THAT time, the manufacture was carefully supervised and the insignia of the maker appeared on each leaf; the removal of this stamp from legal documents was proscribed by imperial decree. In this connection it is interesting to note that the use of water marks, so familiar to us in paper, was a European innovation in this oriental product; the earliest extant water mark is an Italian one of the year 1282.

The papyrus was not readily adaptable for codex (book) form, being generally used in a roll or volumen. Merovingian books combined parchment and papyrus leaves, and after the seventh century in Europe parchment gradually superseded papyrus. After Egypt's collapse to the Arabs, Sicilian factories, where the plant was grown, supplied the paper needs. A roll made of sheets fastened together was occasionally of great length, and examples may be found in museums. Outstanding are the Harris Papyrus of 131 feet in London and the Medical Papyrus of Ebers, more than 65 feet long, in Leipzig.

1877 is the date of the earliest important find of old papyri in the Egyptian Fayum; these are largely Byzantine. Large quantities of them have since been disinterred, almost exclusively in Egypt. Rolls found at Herculaneum in the eighteenth century are charred to a brittleness which prevents their being unrolled. We have rolls in many languages, Egyptian, Hebrew, Syrian, Greek, Latin, and Arabic.

Egyptian papyri, the science of papyrology, discloses much to our age about the life of two thousand years ago: literature, much of it inconsequential, some of it great Greek writing, such as Aristotle's "Treatises on the Constitution of Athens," the "Persians" of Timotheus, and other works unearthed in the Fayum in the nineteenth century; business accounts in great volume; international correspondence, and those personal missives never meant to be preserved, which show the man beneath the historical image; no newspapers as we know them, instead long rolls that lay with the mummies, Books of the Dead, charms to placate the gods—for in Egypt, throughout her history, preoccupation was not so much in the passing scene as in the life hereafter.

Egypt, though a stronghold of the early faith, yields few Christian papyri. It is questionable whether the material substance of our paper, produced in such vast quantities, of such divers materials, with all the ingenuity of modern science, will endure as has the Egyptian papyrus underneath her desert sands. The Muhammadan conquest brought paper to Northern Africa, where it was manufactured with cotton fiber, and relegated papyrus in Egypt herself to the past. To us it remains, like the vellum of the mediæval palimpsests, treasure of the ages.

Ancient Papermaking in the Orient

By Dard Hunter

THE date usually given for the actual invention of papermaking in China is 105 A. D., but this date is chosen rather arbitrarily, as the first experiments in making paper from disintegrated fiber probably extended over a long period before the process was actually brought to any degree of perfection. The date 105 A. D. is usually cited as the time of the first papermaking, for in that year the invention was reported officially to the emperor by the eunuch, Ts'ai Lun. It is not known whether Ts'ai Lun was the real inventor or simply the official who became the patron of the invention, but with the Chinese people the name of Ts'ai Lun will always be closely identified with the beginning of papermaking.

The Che Ming reported that "the ancients used stones to pound the silk waste into fibers, and under the reign of Ho Ti (89 A. D.), of the Han Dynasty, Ts'ai Lun himself was sent to make paper and used the bark of trees and old rags, but he was not the original inventor." It is certain that paper made from rags and various plant fibers was in use in China in the early centuries of the Christian era; this paper was used for writing and for wrapping, even napkins and toilet paper were in use.

Ts'ai Lun's residence was situated in the district of Leiyang and belongs today to the department of Heng Chow, province of Hunan. Early writers relate that near the home of Ts'ai Lun there was found a pool and south of the pool, at the west of the house, there could still be seen the stone mortar that had been used by Ts'ai Lun in the maceration of the material for making into paper. This mortar was offered to the emperor in payment of some ground rent and he had it placed in the imperial museum. It is said that this mortar was still preserved as a curiosity in the T'ang Dynasty (618–907 A. D.). At the present time nothing remains of the equipment used at the beginning of papermaking.

From early centuries the people of Japan had communication with Korea, and it was from that locality, then part of China, that the Japanese, in 610 A. D., gained their initial knowledge of paper, when sheets of this substance fabricated from the bark of the mulberry tree (Broussonetia papyrifera), were brought to Japan, in the form of books, by a native priest, named Doncho. The first paper actually made in Japan was produced during the reign of Suiko Tenno by a group of Buddhist

priests whose work attracted the attention of the crown prince, Shotoku (572–623 A. D.). Crown Prince Shotoku became deeply engrossed in the art of papermaking. He not only occupied much of his time and spent considerable money in this pursuit, but encouraged others to acquaint themselves with this new, elusive craft. The empire was searched for papermaking materials, and numerous experiments were conducted with the barks of native wild plants and shrubs.

THE first paper of Japan, unlike that introduced by Doncho from Korea, was not made from the paper mulberry, but from barks that were inferior to this excellent material. In an endeavor to emulate the Korean and Chinese paper, Prince Shotoku ordered that the paper mulberry tree be cultivated in the principalities of Echizen, Ise, Satsuma, Idzumo, Tosa, and Osumi, and that the technique of forming sheets of paper be taught to the people. This command resulted in wide-spread progress in the growing of mulberry trees and in the actual making of paper. The principality of Tosa, in Kōchi, in the southernmost part of the island of Shikoku, early became a great papermaking district and to this day remains one of the principal papermaking centers of Japan.

In the past most excellent paper has been made in China, but the present-day aspect of the handmade paper industry of that great country is not encouraging, although there are thousands of handmade mills in operation. For the most part the Chinese seem to have lost the technique of fine papermaking by hand and in only a few of the mills does the paper compare with the quality produced a hundred years ago. In Japan the papermakers have kept abreast with the times and have adapted their handmade papers to various commercial and industrial uses. There are about 1,400 individual paper mills in Japan making genuine handmade paper. In Europe several dozen handmade paper mills continue to operate, while in America no handmade paper is produced. A few years ago there was an attempt in this country to revive the making of paper by hand in a commercial way, but due to numerous causes the project was abandoned after experimenting for several years.

The above article was extracted by Dard Hunter from two of his books: "Old Papermaking in China and Japan" (1932), and "A Papermaking Pilgrimage to Japan, Korea, and China," (1935). Upon application to Dard Hunter, The Mountain House, Chillicothe, Ohio, elaborate announcements printed on handmade paper dealing with these two books will be sent gratis to readers of THE CHEMIST.

A Future Pulp and Paper Industry

By Anthony J. Dimond

The Delegate to Congress from Alaska describes the untouched timber resources of that territory: "Alaska can produce almost one-third of the paper required in the United States."

THE main spruce and hemlock forests of Alaska are found in the southeastern part of the territory at or close to the water's edge. Data compiled by the United States Forest Service show that these forests are capable of producing 1,500,000 cords of pulp wood annually, which is equivalent to 1,000,000 tons of newsprint when reduced. At the present rate of paper consumption in the United States, this means that Alaska can produce almost one-third of the paper required in this country. These estimates are based not on the harvesting of a single crop but on a plan of scientific logging whereby the yield would be perpetual. The industry could give employment to about 10,000 men. This, in brief, indicates the possibilities of the paper and pulp industry in Alaska.

The United States is importing about 75% of the pulp and newsprint used from foreign countries, yet it has undeveloped a potential supply of timber in its own country. It has been said that this resource is being conserved. It happens, however, that the Alaskan forests constitute a crop that grows, matures, and if not taken at the right time, dies and is lost; just as truly as any plant crop. Scientific logging would keep this industry active in Alaska, humanly speaking, for all time. Abundant water-power available in this same region the year round and freight by water to the United States offer economic advantages to the development of the paper industry in the Territory.

Paper consumption in the United States is increasing each year. Domestic mills increased their output one per cent in 1934, while those in Canada increased theirs twenty-nine per cent, to meet this demand.

A long-established market or economic inertia may prevent the early development of this industry in Alaska. However, the timber resources are there for a pulp and paper industry of the future.

Our Place in Society

Robert L. Perkins, F.A.I.C.

ONE of the principal objectives of the American Institute of Chemists is stated to be: "To educate the public to an appreciation of the professional chemist as a valuable public servant, to whom is entrusted many important problems involving life, health, and property."

Does this statement mean merely that we demand "a place in the sun" that we desire to bask in the light of public approval? Or does it mean that our regard for our science and profession leads us to believe that we are fitted and therefore under obligation to serve, and that we desire larger opportunities for service through public understanding? Surely the latter is the only interpretation possible to the beneficiaries of the rich legacy of those who founded, and those who have fostered, our science.

In a world filled with the din of advertising we can expect little attention to trumpets of self-glorification. We can expect little interest among members of our own ranks in an attempted chorus of self-praise. But the most modest chemist, if he has caught the true spirit of science, can find inspiration in the ideal of service to his fellow man.

We desire then, larger opportunities for service through public appreciation of, and confidence in, our ability to serve. To have this appreciation and confidence, the public must have some insight into the workings of our minds, and an understanding of our purposes. The layman can have only a passing and rather perfunctory interest in the technique of a science which appeals to him as a sort of conjury. He can have a keen interest in methods of thought, in goals to be reached, and in means of reaching them. In these fields we can meet the public upon a plane of common interest; we can converse with the non-technical man in a common language.

Our method of thought is, or should be, outstanding. Chemistry is a science. There are many branches of science, differing as to subject matter, but having one fundamental characteristic which binds them together as a classification of human endeavor: the scientific method of thought. It is this which distinguishes the futile gropings of alchemy from the accomplishments of chemistry. The beliefs of alchemy were based upon desires; the facts of chemistry, upon a patient and honest

search for truth with a glorious disregard for the idols which might be shattered on the way—idols worshiped merely because some one had placed them upon pedestals and had vainly promised that they would fulfill men's desires.

THESE idols of vain desire are still worshiped. They still stand in the path of human progress and obscure man's view of the only power which can aid him in his struggle for a higher life—truth. How often a point in argument on topics of the day meets with the shocked reply, "But that is socialism," or, "That is contrary to the spirit of our forefathers." The inference is, that, true or not, we must not believe the statement because such belief might lead to an undesirable state of affairs. When Galileo taught that the earth moved around the sun he was met with cries of "Heresy." The earth continued to encircle the sun, undisturbed by those cries. Natural laws have always continued to function independently of human doctrines, but man is slow to realize that it is more important to harmonize his beliefs with facts than with preconceived notions or desires.

Science began its life when certain men ceased to judge theories by desirability and began to apply only one broad test—truth. The progress of science in the various fields it has entered has been proportionate to the devotion of the scientists' search for truth and their refusal to be diverted by a desire to fit theories to pre-conceived patterns. This attitude toward man's problems is the foundation of science and of the scientific method of thought. This principal of adjustment of the mind to fit facts, of pursuit of truth regardless of how far from the beaten path the chase may lead, has proved itself by its fruits. Its use should have a far wider application than it has—an application to all the problems of mankind. It is no easy task to change mental habits. But the seed should be broadcast and in the sowing, chemists should be leaders.

If our purpose were only to secure public appreciation of our profession, such leadership would be a means to the desired end. But our purpose is broader than this. It includes service. The every-day work of the chemist is a public service in the sense that it is instrumental in providing man with comforts and luxuries. The public realizes that luxuries have multiplied and probably dimly realizes that chemistry has had some, to it unknown, connection with the process. Without technical training it can have little conception of, or interest in, the physical processes by which comforts and luxuries are produced. A quick appeal

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INSTITUTE NOTES

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HOWARD S. NEIMAN, *Secretary*
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ALAN PORTER LEE, *Treasurer*

COUNCILORS

1936	1937	1938
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HERBERT R. MOODY	WALTER T. TAGGART	W. T. READ
FLORENCE E. WALL	FREDERICK W. ZONS	N. A. SHEPARD
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Philadelphia	*New York*	*Washington*	*Niagara*
M. TRUMPER	LLOYD VAN DOREN	C. W. WHITTAKER	ARTHUR W. BURWELL

National Council

June Meeting

The one hundred and twenty-third meeting of the Council of the AMERICAN INSTITUTE OF CHEMISTS was held at The Chemists' Club, 52 East 41st Street, New York, N. Y., on June 20, 1935, at 6:30 P. M. President M. L. Crossley presided. The following Councilors and Officers were present: Messrs. F. C. Breyer, M. L. Crossley, H. S. Neiman, W. T. Read, F. W. Zons, and Miss F. E. Wall.

The minutes of the previous meeting were read and accepted. The Treasurer was absent and submitted no report.

Upon motion made and seconded, Dr. O. P. Amend was elected an Honorary member of the Institute, and the Secretary was requested to write him to that effect.

The Secretary read a letter from the American Express Company regarding entertainment for a group of visiting German chemists and the Secretary was requested to refer the letter to the Chairman of the Chemical Industries Exposition, and to notify him that we will be glad to cooperate.

The Secretary reported that the membership now totaled 681. Dr. Read, Chairman of the Committee on Membership, reported progress, and that he hoped to have additional members by the end of the summer.

The Secretary reported that the following students received Chapter awards of Student Medals and Junior Memberships in the Institute for "scholastic excellence:"

John Walter Plauka, Rutgers University; Hannah Elizabeth Chelius,

College of St. Elizabeth; Sol Kipness, Brooklyn College; Isidore Adler, College of City of New York; John Boustead, Stevens Institute of Technology; John E. Seubert, University of Buffalo; Harry L. Clark, Jr., George Washington University; Louis Robert Heiss, American University; Francis P. McGrath, Georgetown University; and Hillman C. Harris, University of Maryland.

The Secretary read the "Seven Point Plan" submitted for Council consideration by Dr. Lundstrom, and taking up Point 1, upon motion made and seconded, the Council voted to continue the present policy with regard to Honorary members. Point 2 has already been done. Points 3 and 4, upon motion, were referred to the Committee on Professional Education. Point 5 was approved. Points 6 and 7 were approved. This "Seven Point Plan" appears under *Institute Notes* in the May, 1935, issue of THE CHEMIST.

Upon motion made and seconded, the President was requested to appoint a committee to consider thoroughly the matter of a project to be carried out by chemists to aid humanity, and ways and means of having it supported from the Government appropriations of four billion dollars.

The President appointed a Budget Committee, consisting of Dr. Zons, Dr. Read, and Mr. Baëza, to report at the next meeting of the Council. The Council elected the following Committee on Professional Education: Dr. Baker, *Chairman;* Dr. Clarke, Dr. Hoover, and Miss Wall. The Council elected the following Committee on Ethics: Dr. Moody, *Chairman;* Mr. McBurney and Dr. Post. The Qualifications and Membership Committees were continued. On motion made and seconded, the Council voted that the above-mentioned committees be composed of the members indicated.

There being no further business, adjournment was taken.

Institute Suggests Relief Projects

(*Continued from page 268*)

Conservation of Natural Organic Materials.
Utilization of Peat as a Fertilizer.
Coordination of Results of Investigations of Organic Chemists and Pharmacologists.
Experimental Work in Synthetic Drugs.
Naval Stores Research.
Investigation of Food Products.
Water Supply Investigations.
Study of Road Materials and Colors.

Pulp and Paper Industry

(*Continued from page 279*)

tar, may some day become an important by-product with outlet in the organic chemical industries. The solution of such problems offers much room for activity and opportunities for the future for chemists engaged in the manufacture and testing of modern pulps and papers.

BOOK REVIEW

A REVIEW OF THE PATENTS AND LITERATURE ON THE MANUFACTURE OF POTASSIUM NITRATE WITH NOTES ON ITS OCCURRENCE AND USES. BY ROLIN W. WHITTAKER AND FRANK O. LUNDSTROM. *U. S. Department of Agriculture.* Misc. Pub. No. 192.

One of our eminent political figures was known for his frequent use of the words, "Let's look at the record." For the chemist there can hardly be a better motto. Hence THE CHEMIST welcomes this monograph by two Fellows of the Institute.

The authors, in a thoroughly documented work, have included a discussion of the statistics, uses, occurrence, and production of potassium nitrate. They include citations of 495 patents in the United States and foreign countries and 64 literature references.

Probably in works of this kind the government bureaus can contribute most valuably to our scientific and industrial development with the least trespass on the proper field of the private consultant.

K. M. H.

Our Place in Society

(*Continued from page 286*)

to interest and to imagination can be produced by a consideration of the mental processes behind the physical processes and also of the purposes that govern these mental processes.

There is some evidence of a vague uneasiness concerning the purposes of scientists. Fiction and comic strips have portrayed a world governed by a group of men utilizing a profound knowledge of scientific facts to hold the rest of humanity in bondage. Science has no such purpose. The public should be made to realize that our aim is not to dominate, but only to share with it the mental processes by which the results of scientific efforts have been accomplished, so that these mental processes can be more widely applied.

The scientific method of thought might be summarized in a motto: "Truth for truth's sake." It has been applied to human problems in rather limited fields. If the chemical profession will assume a leading rôle in teaching, both by precept and example, the application of scientific mental processes to all lines of endeavor, it need have little concern for its place in society.

Applications for Membership

FELLOWS

GEORGE R. BANCROFT, *Professor of Physiological Chemistry*, Jefferson Medical College, Philadelphia, Penna.

ERNST BERL, *Research Professor of Chemistry*, Carnegie Institute of Technology, Pittsburgh, Penna.

EMMETT BRYAN CARMICHAEL, *Professor Physiological Chemistry*, University of Alabama, University, Ala.

JOHN ELMER CAVELTI, *Associate Professor of Chemistry*, Wesleyan University, Middletown, Conn.

HENRY N. A. DEPHILLIPS, *President*, Coating Materials Laboratories, Inc., Brooklyn, N. Y.

WILLIAM HOWLETT GARDNER, *Research Professor*, Polytechnic Institute, Brooklyn, N. Y.

CLAUDE GORTATOWSKY, *Assistant to Vice-president in charge of Chemical Control*, Coca-Cola Company, Baltimore, Md.

IRVING W. GREENBERG, *Consulting Research Chemist*, American Aniline Products, Inc., 66 University Place, New York, N. Y.

MERLE L. GRIFFIN, *Senior Chemist*, Shell Petroleum Corp., Wood River, Ill.

WILLIAM H. HILL, *Chemist*, American Cyanamid Company, New York, N. Y.

ROBERT E. HORSEY, *Chief Chemist*, Mabrand Products, Inc., Long Island City, N. Y.

FRANCIS G. METRO, *Technical Engineer*, The Porter Company, Hagerstown, Md.

CHARLES E. MORGAN, *Chief Chemist*, N. Y. State Racing Commission, New York, N. Y.

CHARLES PALEY, *Chemist*, Certified Laboratories, Inc., 19 Hudson Street, New York, N. Y.

RAYMOND A. PINGREE, *Chemist*, U. S. Finishing Company, Providence, R. I.

CHARLES M. SCHOEPPLER, JR., *Head of Science Department*, Collegiate School, New York, N. Y.

ELMER FRANCIS WAY, *Secretary - treasurer, and Technical Director*, The Durfee Company, Grand Rapids, Mich.

WILLIAM B. WIEGAND, *Research Director*, Binney and Smith Company, New York, N. Y.

JUNIORS

DONALD C. BUNTING, *Laboratory Assistant*, Johns Manville Corp., Manville, N. J.

ARTHUR P. DEMARCO, 700 North 40th Street, Philadelphia, Penna.

JOHN W. HEISLER, *Analyst*, Continental Distilling Corp., Philadelphia, Penna.

LUCY T. PORCELLI, *Technician*, Swedish Hospital, Brooklyn, N. Y.

STUDENTS

HENRY L. LINDER, *Laboratory Assistant*, Monsanto Chemical Co., Monsanto, Ill.

MITCHELL ANDRE SIEMINSKI, *Senior*, Massachusetts Inst. of Tech., Cambridge, Mass.

NEWS

The Fall meeting of the Technical Association of the Pulp and Paper Industry will be held at the Ambassador Hotel, Atlantic City, September 18th to 21st, inclusive.

Dr. Bernard L. Oser, F.A.I.C., Director of the Food Research Laboratories, Inc., New York, N. Y., sailed on July 26th to attend the Fifteenth International Physiological Congress held in Leningrad and Moscow, August 8th to 18th.

An appropriation of $1,970,311.00 to the Government Bureau of Mines for the new fiscal year beginning July first was granted in the Interior Department supply bill. This is an increase of approximately $600,000.00 which will enable the Bureau to resume work previously curtailed, such as investigations of health hazards in the mineral industries; instruction in safety and first-aid; economic and statistical studies of the industry; activities at the Experimental Mine, Bruceton, Penna., with relation to mine ventilation, roof support, and dust and gas explosions; data on comparative fuel values of coals; electro-metallurgical research to develop possible uses for surplus power at Boulder Dam, Muscle Shoals, etc.; methods of production of petroleum with minimum waste; standardization of ore-testing methods, etc.

The United States Department of Labor requests chemistry and engineering publications to notify their readers that the Bureau of Labor Statistics has undertaken a comprehensive survey of the engineering profession, but that this survey is not for the purpose of placing unemployed engineers, although the final report may contain information from which a program may be formulated to deal with unemployment in the engineering profession.

Gustavus J. Esselen, F.A.I.C., announces that the firm of Gustavus J. Esselen, Inc., is now located at 857 Boylston Street, Boston, Mass.

Frederick Kenney, F.A.I.C., retired July 16th from his position as chief chemist for 15 years of the Central Testing Laboratory of the Department of Purchase of the City of New York. This laboratory under Mr. Kenney's direction made detailed analyses of everything purchased by the City. Dr. Stroud Jordan, with a title of Deputy Commissioner of Purchase, now has charge of this laboratory for testing and development of specifications.

Karl M. Herstein, F.A.I.C., consulting chemist, and Frederick Kenney, F.A.I.C., formerly chief chemist for the City of New York's Department of Purchase, have formed the consulting firm of Kenney-Herstein, Inc., with offices and laboratories at 18 East 41st Street, New York, N. Y. The Institute wishes them success.

O. C. Ralston, former director of research for the United Verde Company at Clarkdale, Arizona, has been appointed as supervising chemical engineer of the Nonmetallic Minerals Experiment Station of the Bureau of Mines at New

Brunswick, N. J. Mr. Ralston succeeds Dr. Everett P. Partridge, who resigned to enter private employment.

Dr. Frederick W. Zerban, F.A.I.C., chemist in charge of the New York Sugar Trade Laboratory, Inc., is at present on a trip to Australia. He is expected to return on October 18th.

Samuel C. Levy, F.A.I.C., formerly chief chemist of the H. F. Watson Mills, Erie, Penna., a division of the Ruberoid Company, is now associated with Pioneer Asphalt Corporation.

Karl B. Thews, F.A.I.C., formerly production chemist for the Central Stamping Company, Newark, N. J., has accepted a position as development engineer with the Titanium Alloy Manufacturing Company of Niagara Falls, N. Y.

The recently formed Interstate Sanitation Commission, comprising New York, New Jersey, and Connecticut, is formulating plans for purifying bordering waters and protecting sewage disposal in New York City. The Executive committee consists of: Joseph P. Day, *Chairman;* J. Spencer Smith, and Colonel J. Lester Eisner of New Jersey, General Sandford Wadhams, director of the Connecticut State Water Commission, and Gerald W. Knight, secretary of the commission.

The British Association for the Advancement of Science on September sixth heard the announcement by Dr. Gustave Hertz, physicist at the Siemens Engineering Works in Berlin, that he had succeeded in producing "heavy neon" or Neon 22, until now never obtained in a pure state. Dr. Hertz said he pumped a mixture of mercury and neon gas through narrow necked glass containers connected by tubes. The mercury was thrown off as the mixture passed from one container to another, leaving the heavy neon in equal proportion with ordinary neon, instead of one part of Neon 22 to 93 parts of Neon 20, as it usually occurs.

The National Electrical and Radio Exposition will be held at Grand Central Palace, New York, N. Y., September 18th to 28th.

A permanent exhibition of metals and plastics known as Metal Products Exhibits will be opened September 16th, on the third floor of International Building of Rockefeller Center, New York, N. Y. The exhibit will include ferrous and non-ferrous metals and alloys as raw materials; semi-finished and finished parts; metal finishes of all kinds; plastics as raw materials and moulded parts; fabricating processes; ideas for designs and styling.

Lewis Marvin Drake, a Fellow of the Institute since 1924, died at his home at Daytona Beach, Florida, July 16th. Born at Lyons, Michigan, in 1889, Mr. Drake studied at Michigan University, taught for several years in Michigan and in Massachusetts. He established his laboratory at Daytona (now Daytona Beach) Florida, in 1905, where he contributed much to Florida's industrial development. His specialty, to which he devoted more than 25 years of research, was electrochemistry.

Schedules of Meetings for Chemists' Organizations in New York, 1935-1936

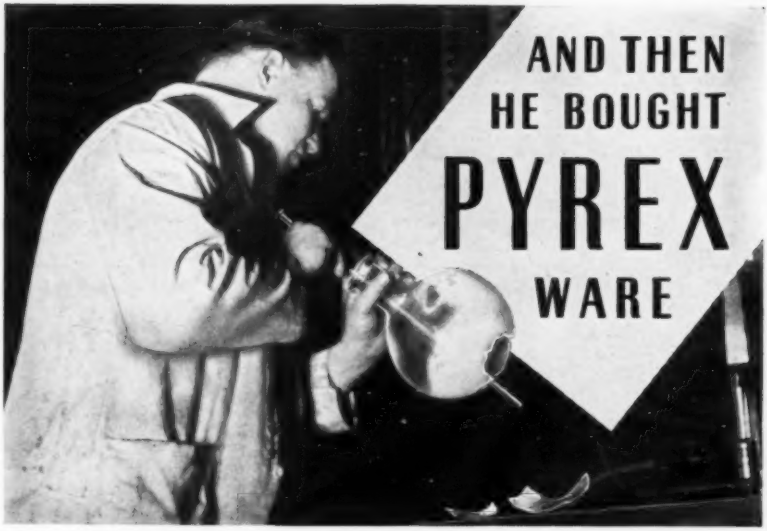
The secretaries of the chemical societies in the New York area have informed this office of the dates on which they plan to hold meetings during the coming season. We are, therefore, able to offer the following schedule for the convenience of chemists who will attend meetings in New York City.

W. J. BABZA, *Secretary*
New York Chapter
THE AMERICAN INSTITUTE OF CHEMISTS

October	11, 1935	American Chemical Society
October	25, 1935	THE AMERICAN INSTITUTE OF CHEMISTS
November	8, 1935	Chemical Industry Medal (with A. C. S.) Society of Chemical Industry in Charge
November	22, 1935	The Electrochemical Society
December	6, 1935	American Chemical Society
December	13, 1935	THE AMERICAN INSTITUTE OF CHEMISTS
January	10, 1936	Perkin Medal (with A. C. S.) Society of Chemical Industry in Charge
February	7, 1936	American Chemical Society
February	14, 1936	THE AMERICAN INSTITUTE OF CHEMISTS
February	21, 1936	Society of Chemical Industry
February	21, 1936	The Electrochemical Society (tentative)
March	6, 1936	Nichols Medal (with S. C. I.) American Chemical Society in Charge
April	10, 1936	American Chemical Society
April	17, 1936	Society of Chemical Industry
April	24, 1936	THE AMERICAN INSTITUTE OF CHEMISTS
May	8, 1936	American Chemical Society
May	15, 1936	The American Electrochemical Society
May	29, 1936	THE AMERICAN INSTITUTE OF CHEMISTS (Business Meeting)
June	5, 1936	The American Chemical Society

The first meeting of the Société de Chimie Industrielle will be held sometime in November. Dates of meetings will be announced later for this Society and for the newly formed Italian-American Chemical Society.

At a meeting held on June 19, 1935, at New York University, New York, N. Y., a new chemical society was formed, THE ITALIAN-AMERICAN CHEMICAL SOCIETY. It was organized to encourage the exchange of scientific knowledge between chemists and industrialists of Italy and America. The officers are: *President*, Jerome Alexander, F.A.I.C.; *Vice-president*, William C. MacTavish, F.A.I.C.; *Secretary* and *Treasurer*, Genio F. Reale; *Council*, Kenneth C. Blanchard, Frank Brescia, J.A.I.C., G. de Bethune, Alexander O. Gettler, Joseph Matiello, Vittorio Molinari, Ernest Conti, Wallace T. Cohoe, Harold C. Urey, and F. Quattrone.



AND THEN HE BOUGHT PYREX WARE

Chemists know that broken glassware means waste and expense, in equipment, chemicals and time. And they know, from universal testimony and from daily experience, that "PYREX" Ware is the most satisfactory.

And it is also the most economical, because it resists breakage. "PYREX" brand Laboratory Glass has the lowest co-efficient of expansion of any commercial glass—0.0000032—which makes it unequalled in its ability to withstand sudden changes of temperature.

Because of this fact it is possible to use heavier and therefore stronger construction, to resist breakage under accidental jars and jolts.

Its superior composition resists the corrosion of powerful chemicals and protects the purity of solutions.

These features mean economy and convenience to the chemist who standardizes on "PYREX" Ware.

ACCURATE 60° ANGLE FUNNEL

BE SAFE! *See that this trade-mark is reproduced exactly on every piece of apparatus you buy.*

T.M. REG. PYREX U.S.PAT.OFF.

"PYREX" is a trade-mark and indicates manufacture by

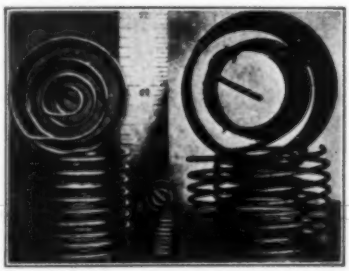
CORNING GLASS WORKS • CORNING, N. Y.

Pyrex BRAND **LABORATORY GLASSWARE**

SPECIAL EQUIPMENT
with
SPECIAL ADVANTAGES

Chemical processes sometimes fall short of efficient operation on a commercial scale due to failure to take advantage of simple mechanical improvements. Often these improvements reduce the cost as well as improve the process. Such is the case with Bregeat multiple coil metallic tower filling. Having made tests on the relative merits of various tower packing materials and determined the high efficiency of Bregeat coils we are now offering equipment which makes use of their advantages. Such equipment, either designed by us or in collaboration with our clients, includes EVAPORATORS, SOLVENT RECOVERY PLANTS, SCRUBBING TOWERS, DISTILLING APPARATUS, RECTIFIERS, AIR WASHERS, SEPARATORS. TETRALINE EQUIPMENT for gas plants, ABSORPTION EQUIPMENT for natural gasoline, and miscellaneous equipment where large surface contact is required between vapors and liquids.

Bregeat Coils made in one piece of concentric helices of wire



Made in four laboratory sizes and three industrial sizes using any ductile metal

In addition to being included in Croll-Reynolds apparatus mentioned above these coils are offered separately. They offer greater surface contact and lower friction loss than any other type of tower packing. They are in successful service in hundreds of plants. An 8-page bulletin and prices will be furnished on request.

CHEMICAL PROCESS DEPT.

CROLL-REYNOLDS ENGINEERING CO., Inc.

17 John St., New York — Phone Cortlandt 7-2793

Other Croll-Reynolds products include Steam Jet Evactors, Vacuum Refrigeration Apparatus, Heat Exchangers, Heaters, Condensers, Alloy Steel Expansion Joints, Castings, Steel Plate Equipment, and Special Apparatus.